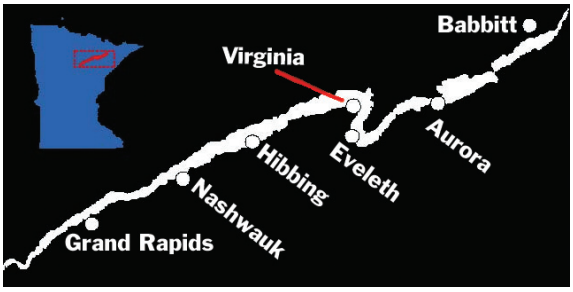
Explore Minnesota: IRON ORE

Minnesota is a mining state. Its six iron ore operations produce about 40 million tons of high-grade iron ore annually, which is approximately 75 percent of total U.S. iron ore production. To produce 40 million tons of high-grade iron ore, Minnesota moves on the order of 240 million tons of material including 135 million tons of crude ore and 105 million tons of surface and rock stripping.

Geology

The Mesabi Iron Range in a narrow belt, approximately three miles wide, of iron-rich sedimentary rocks, otherwise known as the Biwabik Iron Formation. The Mesabi Iron Range extends in a northeasterly direction for approximately 120 miles from west of Grand Rapids, Minnesota, through Itasca County to east of Babbitt, Minnesota, and the eastern edge of St. Louis County.

Most of the formation is buried by glacial drift, creating an intermittent, narrow outcrop pattern. The rocks are middle Precambrian in age, about 1.8 billion years old, and consist of iron carbonates and iron silicates. In general, it is chert-magnetite iron formation. The beds have a shallow dip, about 9 or 10 degrees, toward the south.



History of Iron Mining

Iron ore mining first occurred in Minnesota on the Vermilion Iron Range in 1884 and has since occurred on the Mesabi Iron Range, Cuyuna Range and the Filmore County District. For the past 25 years, all of Minnesota's iron mining has occurred on the Mesabi Iron Range.

Iron ore was first reported on the Mesabi in 1866, but mining did not begin until 1890 near the current location of Mountain Iron. Between 1890 and 1892, mining began at Biwabik, Eveleth and Chisholm. The first mining on the Mesabi exploited the so-called "natural ore", which is a weathering or alteration of the Biwabik Iron Formation along fractures or other areas of permeability, oxidizing the magnetite to hematite and removing silica or carbonate, thus enriching the ore to 50-60% iron. From 1890 to about 1980, 2.5 billion tons of this ore were mined, and these "natural ores" have been all but exhausted.

Mining of the low-grade iron formation, or chert-magnetite ores, began during the 1950s. About 20 to 30% iron, these low-grade ores are beneficiated and upgraded to high-grade iron ore with an iron content of approximately 65%. To date, approximately 1.6 billion tons of high-grade iron ore pellets have been produced from Minnesota's Mesabi Iron Range.

Active Iron Mining Operations

Iron ore, the chief component of steel, is mined and processed on Minnesota's Mesabi Iron Range. After being extracted from the ground, the iron ore is crushed into a fine powder and separated from impurities with the use of magnets. The concentrated powder is then agglomerated into marble-sized pellets that are later fed into blast furnaces.

Three companies operate a total of six iron mining and processing facilities on Minnesota's Mesabi Iron Range.

Cliffs Natural Resources

CLIFFS

Cliffs Natural Resources is the largest producer of iron ore pellets in North America, and it sells the majority of its pellets to integrated steel companies in the United States and Canada.

The Company operates three iron ore mines in Minnesota: Hibbing Taconite Company, Northshore Mining Company and United Taconite, LLC. Cliffs Natural Resources Minnesota mines have the combined annual capacity to produce 18.2 million tons of iron ore pellets annually. Based on its percentage ownership of the mines it operates in Minnesota, Cliffs' share of the rated pellet production capacity is currently 12.5 million tons annually.

The Company sells its share of iron ore production to integrated steel producers, generally pursuant to long-term supply agreements with various price adjustment provisions.

ArcelorMittal

ArcelorMittal is the largest steel producer in the world, formed from the consolidation of Mittal Steel's existing U.S. business, Ispat Inland, with the assets of International Steel Group.

Followed by the purchase of Arcelor, ArcelorMittal owns and operates the Minorca Mine in Minnesota and has 62 percent ownership of Hibbing Taconite Company operated by Cliffs Natural Resources. ArcelorMittal is currently producing iron ore from its Laurentian and new Biwabik mine pits.

U.S. Steel

United States Steel Corporation is the second largest steel producer in the United States and makes all of its steel by processing iron ore and other raw materials in blast furnaces. U.S. Steel is currently undergoing environmental review for an expansion of its Keewatin Taconite facility from six million to nine million tons annually. With the expansion of Keetac, U.S. Steel would have the capacity to produce 29 million tons of iron ore pellets annually, of which 25 million tons are from their captive mines in Minnesota.

Minnesota's 1.5 billion tonnes of high-grade iron ore pellet reserves are a significant iron ore reserve by world standards. The three companies that operate Minnesota's six iron ore facilities update and report their iron ore reserves annually.

Other Iron Ore Potential

Although much of Minnesota's iron ore is dedicated to support the six existing commercial operations, there are additional resource areas that offer additional iron ore potential. The major areas include the reserves of the former LTV operation and the identified resources known as the Sherman, Buhl, Kinney and McKinley deposits. These deposits together contain 1.5 billion tonnes of potential high-grade iron ore pellets.

There are also over one billion tons of natural iron ore tailing basins and stockpiles that contain recoverable iron ore. Magnetation, a Minnesota company, is currently recovering high grade iron ore fines from a number of natural iron ore tailings basin located on the Mesabi Range including a new joint venture with Steel Dynamics (80% owner) which will supply iron ore concentrate for the Mesabi Nugget iron nugget plant (see Value Added Iron).

Taxation

The Minnesota Mining Tax Guide is published to summarize Minnesota's mining related taxes paid by the mining industry each year. This book simplifies complicated tax statutes using language that is easy to understand through non-technical narratives, tables, graphs, and flowcharts. This guide can be accessed at www.taxes.state.mn.us/taxes/special/mineral/index.shtml.

Value Added Iron

Two value-added iron projects are underway.

Mesabi Nugget, LLC has constructed the world's first commercial iron nugget plant that is now using a new and environmentally friendly process for producing high purity iron. The ITMK3 process has produced its first iron nuggets containing 97% metallic iron directly from iron ore, which can then be shipped as a prime raw material to electric arc and basic oxygen steel makers and foundries.

The partners of Mesabi Nugget, LLC are SDI of Butler, Indiana and Kobe Steel, Japan. The site for the world's first commercial iron nugget plant is Hoyt Lakes, Minnesota. The Mesabi Nugget plant has a total nameplate production capacity of approximately 500,000 metric tons of nuggets per year, and employs about 100 permanent workers.

Essar Steel Minnesota, LLC, (ESML) part of the Essar Steel Holdings Limited group of companies, is developing a fully integrated, onsite mining through steel-making project on the Mesabi Iron Range in northern Minnesota near Nashwauk, MN. It is designed to produce up to 2.5 million tonnes of steel products each year and employ up to 500 people.

ESML is currently constructing Phase 1 of the project, a 7 million ton per annum taconite pellet facility. Initial pellet production is slated for the second half of 2013, with ramp up to full capacity expected in 2014.

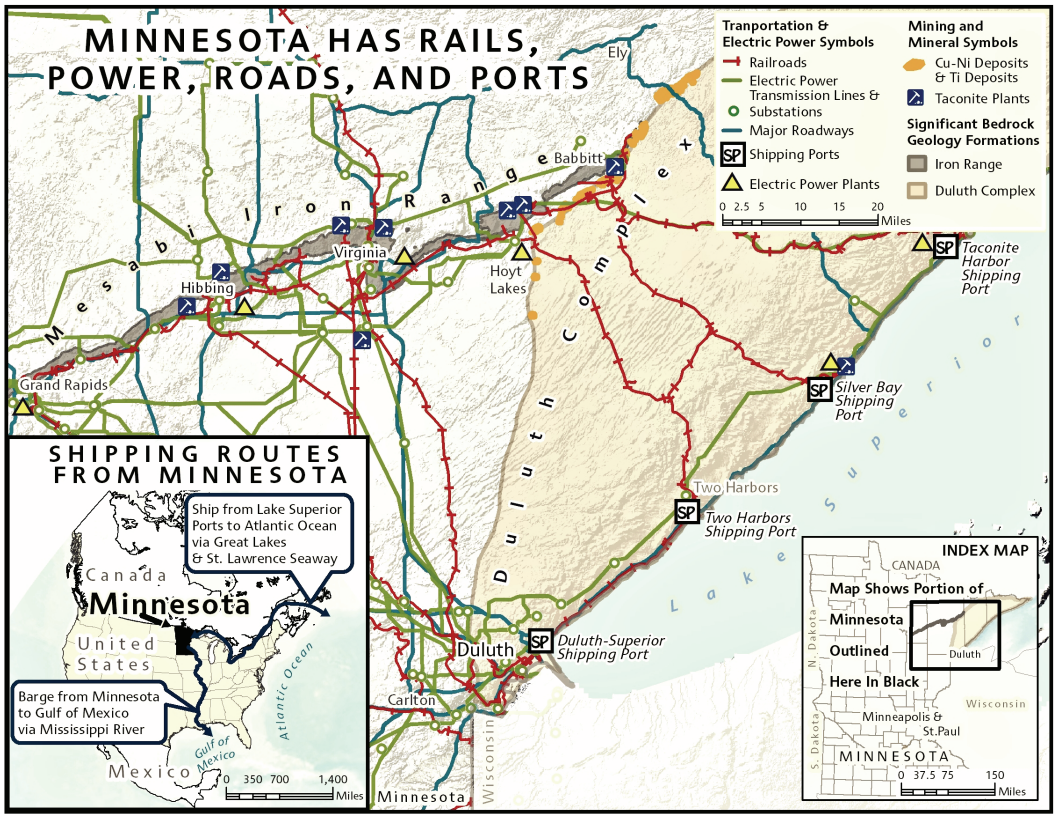
Infrastructure

Minnesota's Mesabi Iron Range is home to several communities that have a long history of supporting the iron mining industry. Minnesota's Iron Mining Association is a trade group promoting the state's mining industry and is represented by over 200 of the state's mining supplier companies. Minnesota has a well-established infrastructure of electric power, roads, rails, and port facilities to support the iron ore industry.

Land and Mineral Ownership

Minnesota's Mesabi Iron Range iron ore potential has been known for more than 120 years, and the land and mineral ownership is well defined and available for iron ore mining and development. Mineral acquisition is generally done by entering mineral leases with fee holders.

The state is the largest owner of mineral rights. It has in place a system of leasing the state's ferrous minerals for mining. Other private mineral holders have an active local presence with fee offices and resource information locally available.



Regulation and Permitting

The two principal regulatory and permitting authorities are the state's Department of Natural Resources and the Pollution Control Agency. Rules for permitting ferrous mining operations have been in place for over 25 years. For commercial operations, the rules require a mandatory Environmental Impact Statement before the approval of any permits. The major issues will generally relate to water appropriation and discharge and in some cases air emissions. A high level of environmental standards is required by the state, and the history of the mining industry in Minnesota demonstrates that conditions can be satisfactorily met.

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